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Proceedings of The Canadian Phytopathological Society

Twenty-second Session

JUNE 20-23, 1955

UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA.

ISSUED JAN. 23, 1956

Editorial Committee
RUTH M. HORNER
JEAN E. NEWMAN
V. R. WALLEN
D. S. MacLACHLAN

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The Canadian Phytopathological Society

LIST OF OFFICERS AND COUNCIL
1954-55.

President

W. C. BROADFOOT, Science Service Laboratory, Lethbridge, Alta.

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P. M. SIMMONDS, Plant Pathology Laboratory, Saskatoon, Sask.

Copies of the Proceedings of the Canadian Phytopathological Society may be obtained from the Secretary-Treasurer at a price of 50c each.

Front row : L. to R. — A. R. Walker, D. S. MacLachlan, P. M. Simmonds, W. C. Broadfoot, G. B. Sanford, W. F. Hanna, J. G. Horsfall, H. Martin.
2nd Row : L. E. Tyner, C. H. Lawrence, J. A. Parmelee, M. W. Cormack, W. Newton, L. W. Koch, C. D. McKeen, H. Genereux, F. Harper.
3rd Row : S. B. Hrushovetz, J. S. Horricks, P. J. Salisbury.
4th Row : W. P. Campbell, R. Horner, V. Slankis, D. MacIntosh, E. Moffatt, J. T. Slykhuis, W. A. F. Hagborg, R. A. Ludwig, N. S. Wright,
5th Row : O. Vaartaja, D. M. MacLeod, B. Denyer, R. Bourchier, J. B. Lebeau, R. D. Tinline, L. C. Callbeck.
6th Row : W. P. Skoropad, M. F. Welsh, D. Day, R. J. Baylis.

Annual Meeting, C.P.S., University of Alberta, Edmonton, Alta., June 20-23, 1955.

John Dearness

1852 - 1954

Dr. John Dearness, educationist, botanist, and mycologist died at his home in London, Ontario, on December 6, 1954 in his 103rd year.

John Dearness was born May 13, 1852 at Hamilton, Ontario, but at the age of four moved with his parents to a farm 20 miles northeast of London. He attended rural school from age 6 to 16, in the latter years doing a man's work on the farm at the same time. He then prepared himself for teachers' examinations at London and later took a three months' course at Toronto Normal School obtaining a special certificate in Natural History, Botany and Agricultural Chemistry. At age 19, he became Principal of Lucan Village School and two years later, Principal of Strathroy Public School. The next year, he was appointed Public School Inspector of East Middlesex, a position which he occupied for 25 years.

In the 1880's, he became engaged more and more in botanical studies and developed an intense interest in Mycology, Microbiology, Entomology, and Phytopathology. He occupied the post of Professor of Biology at the Medical School of the University of Western Ontario from 1888 to 1914. In the 1890's he began to publish jointly with J. B. Ellis on Canadian fungi. He received his B.A. degree in 1902 and his M.A. degree in 1903, both from the University of Western Ontario, by extramural study. In 1918, he was appointed Principal of the Normal School at London, and occupied that post until 1922 when he reached retiring age and was superannuated by the Ontario Government. Shortly after his superannuation he received the Honorary degree of LL.D. from the University of Western Ontario. The diversity of his interests and the scope of his energy is indicated by the number of Societies and Clubs in which he took an active part up to and beyond his superannuation. He was President of the Ontario Education Association (1896-97), President of the Entomological Society of Ontario (1897-98), Auditor of the Ontario Educational Association (1902-1939), member of the University of Western Ontario Senate, member of the Ontario Advisory Council of Education (1909), President of the Ontario Historical Society (1912-1914), and President of the Canadian Division of the American Phytopathological Society (1912-1914, and 1927). During this period he was also an active member and later became Honorary President of the following Clubs: London Baconian Club, London Canadian Club, London and Middlesex Historical Society, London Current Topic Club and the McIlwraith Ornithological Society. He was also secretary of the Ontario Branch of the British Simplified Spelling Society.

Superannuation did not mean retirement to Dr. Dearness and he continued actively with his writing and research almost to the time of his death. During his post superannuation period many well deserved honors were heaped upon him. In 1935 he received the King's Jubilee Medal. He was elected Fellow of the Royal Society of Canada (1936), became a member of the A.A.A.S. (1937) and in 1952 was made a Life Honorary Member of that Society. He was elected President of The Mycological Society of America in 1937. In 1940, he was made honorary member of the Canadian Phytopathological Society, in 1952, honorary president of The Ontario Historical Society and honorary historian of the University of Western Ontario and in 1953, honorary member of the newly formed Canadian Society of Microbiologists. In 1941, the Dearness Research Laboratory in the Montreal Botanic Garden was formally opened. The writings on fungi, which he had started before his official retirement, were continued and between the years 1892 and 1946 he published some 57 Mycological and Botanical contributions.

Dr. Dearness was a friendly man and a good co-operator and collaborator. As a teacher, he was respected and admired by both contemporaries and students and came in later years to be referred to as "Mr. Education" or "The Grand Old Man". When teaching, he seemed able to cast a spell on a class or individual. He did not use punishment, his methods being based on love, intent purpose, and preparedness. He was in constant demand as a lecturer and conducted summer schools all the way from Brandon, Manitoba, to Truro, N.S.

Dr. Dearness had an able and charming helpmate in life in Harriet Emma Wilkinson, whom he married in 1881. Of this marriage there are three children, two daughters and a son. Mrs. Dearness died in 1941 shortly after their 60th wedding anniversary.

Dr. Dearness' latter birthdays, especially his 90th and 100th years were marked by demonstrations of esteem from his friends and colleagues and the people of London. He received greetings from over 500 admirers all over America and beyond on the occasion of his 100th birthday. In May, 1954 he celebrated his 102nd birthday by appearing on Television.

Dr. Dearness' death brought to a close a long and fruitful career. He was an educationist of wide reputation and an eminent scientist, and with his varied interests and practical energy, an intellectual leader.

MINUTES OF THE TWENTY-SECOND MEETING HELD AT THE UNIVERSITY OF ALBERTA, EDMONTON, ALTA., JUNE 20-23, 1955.

Business Sessions: June 21 and June 23.

The first business session was held in the Arts Building, University of Alberta. The meeting was opened by the President, Dr. W. C. Broadfoot, who welcomed the members and visitors to the 22nd meeting of the Society. In a short address, Dr. Broadfoot emphasized the role Society members were playing in meeting the challenge of plant diseases in Canada. He referred to the increased membership and sound financial position as another indication of the success of the Society. The interest of the members in the Society was demonstrated by the fact that several technical papers could not be accepted for presentation at the meeting because of lack of time for presentation.

The minutes of the twenty-first meeting were adopted as printed in Proceedings No. 22, on motion of Wm. Newton, seconded by W. F. Hanna.

The following members were elected to the Nominating Committee for the coming year: W. C. Broadfoot (Chairman), P. M. Simmonds, C. D. McKeen, T. C. Vanterpool, and J. F. Hockey.

The following members were elected to the Resolutions Committee: A. W. Henry (Chairman), J. B. Lebeau, and F. R. Harper.

L. E. Tyner was elected to succeed G. B. Sanford as a member of the Disease Diagnosis Committee on motion of P. M. Simmonds, seconded by C. D. McKeen.

The following membership applications were approved by unanimous vote on motion of W. P. Campbell, seconded by L. W. Koch: John G. Berbee, Roy F. Cain, René Crête, A. Grant Davidson, W. Bruce Denyer, Herman van Groenewoud, Harris H. V. Hord, C. Harold Lawrence, Frank L. Raymond, Douglas R. Redmond, Miss Robena C. Robinson, John G. Shaw, Olli Vaartaja, Roy D. Whitney.

By unanimous vote on motion of W. F. Hanna, seconded by Wm. Newton, the following members were elected to Honorary Membership in the Society: Dr. Ernst Schaffnit, Dr. J. G. Coulson, Dr. H. R. McLarty, Dr. F. L. Drayton, Dr. G. B. Sanford.

The report of the Secretary-Treasurer was adopted on motion of D. S. MacLachlan, seconded by W. P. Campbell.

The report of the Custodian of the Library and Records was adopted on motion of D. S. MacLachlan, seconded by C. D. McKeen.

It was moved by F. J. Greaney and seconded by L. W. Koch that W. L. Gordon be asked to fill the position of Custodian of the Library and Records, and that he contact the Divisional Librarian at Ottawa to decide on the best way to handle the publications now contained in the Society Library.

The report of the Editorial Committee was adopted on motion of Miss R. Horner, seconded by I. L. Conners.

The report of the Nominating Committee was read by P. M. Simmonds, and the slate of officers for the 1955-56 fiscal year was approved by unanimous vote.

No report was presented by the Publications Committee, and on the motion of W. F. Hanna, seconded by F. J. Greaney the committee will remain active for the next year.

The report of the Disease Diagnosis Committee was adopted on motion of D. S. MacLachlan, seconded by M. F. Welsh.

The report of the Terminology Committee was adopted on motion of M. F. Welsh, seconded by C. D. McKeen.

After a lengthy discussion, it was moved by R. A. Ludwig, seconded by W. F. Hanna, that the Virus Terminology Report be published in a Canadian Publication.

The report of the Representative to the Canadian Society of Microbiologists was adopted on motion of A. R. Walker, seconded by D. L. McIntosh.

It was moved by N. S. Wright, seconded by W. F. Hanna, that the Canadian Society of Microbiologists be invited to meet with the Canadian Phytopathological Society at a mutually agreeable date in the near future.

The report of the activities of the Program and Publicity Committee was presented by G. B. Sanford.

It was moved by R. A. Ludwig, seconded by J. F. Hockey, that L. Cinq Mars serve as the C.P.S. representative on the Committee of French Definitions of Common Pesticide Terms established by the Quebec Society for the Protection of Plants.

On a motion of W. C. Broadfoot, seconded by I. L. Conners, H. N. Racicot was appointed to represent the C.P.S. on the Committee on Common Names for Pest Control Chemicals.

The report of the Resolutions Committee was adopted on motion of F. R. Harper, seconded by P. M. Simmonds.

It was moved by L. W. Koch, seconded by R. A. Ludwig, that the committee appointments as suggested by the executive be adopted.

The retiring President expressed his appreciation for the co-operation he had received from the executive and the members during his term of office, and turned the meeting over to the President-elect, Dr. W. F. Hanna, for adjournment.

COMMITTEES

Auditors: Mildred K. Nobles and J. W. Groves.

Custodian of Library and Records: W. L. Gordon.

Disease Diagnosis: H. W. Mead (chairman), W. E. Sackston, L. E. Tyner, G. C. Chamberlain, D. J. MacLeod, Frances C. Mellor, W. A. Benedict.

Editorial: Ruth Horner (chairman), Jean Newman, V. R. Wallen, D. S. MacLachlan.

Nominating: W. C. Broadfoot (retiring president as chairman), P. M. Simmonds, C. D. McKeen, T. C. Vanterpool, J. F. Hockey.

Program and Publicity: D. L. Bailey (chairman), B. H. MacNeill, R. F. Cain, O. T. Page, D. S. MacLachlan.

Publications: W. F. Hanna (chairman), F. L. Drayton, G. H. Berkeley.

Representative to the Canadian Society of Microbiologists: A. R. Walker.

Resolutions: A. W. Henry (chairman), J. B. Lebeau, F. R. Harper.

Terminology: M. F. Welsh (chairman), D. C. Buckland, W. A. F. Hagborg, B. H. MacNeill, H. M. Good, T. C. Vanterpool, R. S. Willison, R. A. Ludwig, W. E. McKeen, C. D. McKeen, D. J. MacLeod, R. Pomerleau, L. E. Tyner, A. W. Henry, A. N. Langford.

Regional Representatives:

Maritimes	—	L. C. Callbeck
Eastern Quebec	—	D. Leblond
Western Quebec	—	F. Godbout
Eastern Ontario	—	R. J. Baylis
Western Ontario	—	B. H. MacNeill

Manitoba	—	W. C. McDonald
Saskatchewan	—	R. D. Tinline
Alberta	—	J. T. Slykuis
B.C. Mainland	—	R. Stace-Smith
Vancouver Island	—	R. E. Foster

REPORT OF THE SECRETARY-TREASURER

Mr. President and Fellow Members :

I have the honour of presenting the following report of the secretary-treasurer for the fiscal year, ending May 31, 1955.

The 21st Annual Meeting of the Society was held on the campus of Macdonald College, St. Anne de Bellevue, Quebec, June 21-24, 1954. The C.P.S. Proceedings No. 22 contains an account of the business sessions, and abstracts of 27 papers which were read at the meetings. On June 21, a reception and banquet was held at the Canada Hotel. The guest speaker on this occasion was Mr. George Maheux.

Membership in the Society now stands at 218 as compared with 196 in 1953-54. The election of 14 new members brings the total membership to 232.

Word was received of the death of Dr. John Dearness, an honorary member of the Society, and a letter of sympathy was sent to his family.

The attached financial statement shows a favourable balance of $353.96.

Respectfully submitted,

D. S. MacLachlan,
Secretary-Treasurer.

FINANCIAL STATEMENT
CANADIAN PHYTOPATHOLOGICAL SOCIETY
June 1, 1954 to May 31, 1955

Revenue :

Balance brought forward			$440.39
Fees :			
1951-52	$ 4.00		
1952-53	4.00		
1953-54	11.00		
1954-55	277.00		
1955-56	44.00		
		340.00	
Interest on Bond		15.00	
Bond cashed		505.00	
SALE of proceedings		2.00	
Sale of tickets (Annual banquet)		135.00	
			997.00
			1437.39

Expenditures :

Banquet (1954 Annual Meeting)	172.70	
C. Maheux (travel expenses)	25.00	
Gratuities (Canada Hotel)	20.00	
Printing of tickets (Annual banquet)	8.98	
Stenographic assistance (A. W. Henry)	25.00	
Printing of Proceedings # 22	248.83	
Receipt books	23.10	
Postage	42.50	
Cash Book	.60	
Bank charges and exchange	4.73	
Bond # 7Z95546	511.99	
		1083.43
Balance (on hand) May 31, 1955		353.96

Additional Asset :

Dominion of Canada 3% Victory Bond (Series P 7Z95546)	500.00

Audited and found correct.

(Signed) J. W. Groves

Mildred K. Nobles

REPORT OF THE CUSTODIAN OF THE LIBRARY AND RECORDS OF THE SOCIETY

The library, at the end of May 1955, contained 739 accessions. Since June 1, 1954 the number of accessions amounted to 48, mostly publications received in exchange for the Proceedings of the Society. In recent years, many organizations have asked for our Proceedings in exchange for publications relating to plant pathology or mycology. It has been the policy of the custodian to accede to such requests unless the material offered in exchange had little or no bearing on plant pathology. In consequence, 19 institutions are at present receiving our Proceedings on a *gratis* or exchange basis.

In last year's report a recommendation was made concerning the disposal of the library. It was suggested: (1) That the collection of reprints be maintained under the control of the Custodian of the Records of the Society; (2) That publications other than reprints be turned over to the library of the Botany and Plant Pathology Division; (3) That records of the Society, including group photographs and photographs of distinguished members of the Society be kept by the Custodian.

This report was adopted at last year's meeting but no steps have been taken as yet to implement it.

Owing to the pressure of various duties the present Custodian feels that he would like to be relieved of the custodianship. In his opinion, the custodianship might be maintained either at Ottawa or Winnipeg, preferably the former since the general direction of plant pathological work is centred there.

T. Johnson.

REPORT OF THE DISEASE DIAGNOSIS COMMITTEE

Members of the committee are anxious that the C.P.S. members make use of the facilities of the Biographic Unit. The head of the Unit has informed the Chairman that one pathologist has had two slides produced from permanent mounts. It is apparent that some person or group should canvass C.P.S. members for material for reproduction in order that a good kodachrome library may be created. Some

decision should be made at the annual meeting as to who should undertake this task. The present chairman has some information, obtained in 1953, on material available for duplication, and this information is available to any person or group.

A member of the committee has referred to a suggestion in the 1952 report that a check list be prepared, and that it include brief descriptions of key diagnostic symptoms. Another committee member brought up this matter and referred to the need of up-to-date guides on what information is available at present on diseases. This member suggested that the following mimeographed papers are examples of what can be done.

Strawberry viruses and virus diseases. Fitzpatrick, Frazier, and Mellor. 1955.

Rubus viruses and virus diseases. Stace-Smith. 1955.

Two members of the committee suggested that some information should be obtained on the Canadian Plant Disease Survey. Mr. Conners has written as follows:

"I would estimate the number of fairly regular contributors to the Canadian Plant Disease Survey as follows:

Science Service —	
Botany and Plant Pathology Division	51
Plant Protection Division	
(on potato diseases)	14
(on plant diseases in Newfoundland)	1
Provincial pathologists	11
Total	77

"There is a certain ebb and flow in the contributions and contributors, particularly at provincial institutions.

"The number of contributors has increased at several laboratories, as a result of staff increases particularly at those laboratories where men have been assigned to investigate the diseases peculiar to crops not previously under study.

"I estimate that 600-650 diseases are reported annually on about 150 cultivated plants, exclusive of the grasses. The list of ornamental plants is subject to considerable change from year to year. In the 1952 Report, 45 ornamental plants were reported but plants in 175 genera have been covered in the last 20 years. Such diseases as aster yellows occur on a wide range of hosts, but nearly every crop plant is affected by some diseases, the pathogens of which are peculiar to that host."

Respectfully submitted,

G. B. Sanford
G. C. Chamberlain
D. J. McLeod
Frances C. Mellor
W. G. Benedict
W. E. Sackston
H. W. Mead (Chairman)

REPORT OF THE EDITORIAL COMMITTEE

The Proceedings of the Twenty-first Session of the Canadian Phytopathological Society were issued on January 19, 1955. They contain the report of the meeting held at Macdonald College, Quebec, June 21-24, 1954, a group photograph of those in attendance, twenty-seven abstracts of papers read at the meeting, and a list of papers published by members between June 1, 1953 and May 31, 1954.

The authors of papers presented at the meeting cooperated with the editorial committee by placing abstracts of their papers in the hands of the secretary either before or during the meeting. The committee wishes to thank them for this co-operation.

The list of papers published by members of the Society still remains the big stumbling block in the preparation of the Proceedings for publication, and is the main reason why publication was so late this year. References to be included in the list of papers published June 1, 1953 to May 31, 1954, were still being received in January of 1955. For this list, approximately 30% of the members included in the list sent in their references on cards with the information given in the proper sequence as suggested in number 22 of the Proceedings. An additional 5% of the members included in the list, sent their references in on a sheet of paper as had been done previously. The remaining 65% of the members included in the list sent no information at all. The committee would here like to express its appreciation to Dr. F. L. Drayton, who has, in the past, kept up to date a list of all papers published by staff members of the Division of Botany and Plant Pathology. With the aid of this list it has been possible for the editorial committee to prepare a more or less complete list of the papers published by members of the Canadian Phytopathological Society for publication in the Proceedings. This list will be kept up in future by the Divisional Editor — Mr. R. Hamilton. The committee has no such check on members of the Society outside the Division unless a complete search of the literature for the past year is undertaken.

In order that the Proceedings may be published at an earlier date, the committee feels that it is necessary to set a deadline of September 30 for receipt of references to be included in the literature list and recommends that the Secretary send a notice to this effect to all members as soon as it is convenient.

R. S. Willison
R. D. Tinline
D. S. MacLachlan
Ruth Horner (Chairman)

REPORT OF THE NOMINATING COMMITTEE

The following slate of officers is presented for election as members of the new Executive of the Canadian Phytopathological Society:

President:	W. F. Hanna
Vice-President:	R. E. Fitzpatrick
Secretary-Treasurer:	D. S. MacLachlan (elected for a two-year term at 1954 convention)
Councillors:	W. C. Broadfoot F. Godbout

Respectfully submitted,

R. C. Russell
J. C. Perrault
A. J. Skolko
C. D. McKeen
P. M. Simmonds (Chairman)

REPORT OF PROGRAM AND PUBLICITY COMMITTEE

The Alberta committee for making local arrangements for the program of the C.P.S. meetings in Edmonton were: M. W. Cormack and J. T. Slykhuis, Lethbridge; V. J. Nordin, Calgary; J. B. Lebeau and G. B. Sanford (Chairman), Edmonton.

The main deviation from previous programs was the inclusion, on Tuesday afternoon, of a symposium entitled, "Present status and future trends in fungicides", under the chairmanship of H. Martin, London, Ontario. The special guest speakers were J. G. Horsfall and Saul Rich, New Haven, Conn. Other contributors were R. A. Ludwig, London, Ont.; D. L. McIntosh, Summerland, B.C.; and C. D. McKeen, Harrow, Ont.

In addition to this symposium, 20 regular papers were presented to the Monday, Wednesday, and Thursday sessions, six of which papers were on diseases of forest trees.

On Tuesday evening J. G. MacGregor, author, Edmonton, addressed the Society on "The Early History of Alberta". Refreshments were served to the guests.

G. B. Sanford (Chairman)

REPORT OF THE REPRESENTATIVE TO THE CANADIAN SOCIETY OF MICROBIOLOGISTS

The Canadian Society of Microbiologists has had two annual meetings since the last report was made in 1954. The fourth annual meeting was held at Kingston immediately following the Phytopathological meetings, and the fifth was held at Winnipeg immediately before these meetings at Edmonton. It is the policy of the Microbiologists to schedule their annual meetings so as to lessen, as much as possible, travel time or waiting delays for members of the Royal Society of Canada and the Canadian Phytopathological Society who might wish to attend the meetings of the Microbiologists.

The Kingston meeting, with 41 scientific papers presented by members, 2 invitation papers and a symposium on Viruses and Virus Diseases, required two sections running concurrently. The Winnipeg meetings had 28 papers by members, 3 invitation papers and a symposium on Stem Rust of Cereals. The enthusiasm shown at this symposium indicates clearly that the members of the Society are interested in Microbiology in its broadest sense. The considerable distance of the meeting place from many of the centers containing large numbers of Microbiologists reduced the attendance this year. However, the papers presented represented a wide range of interests in the field of microbiology and were of excellent character.

This young Society is progressing very satisfactorily and is in a sound financial position. There are 386 members and the cash assets exceed $1,550. Active branches now exist in the Maritimes and the Ottawa Valley. The Canadian Journal of Microbiology, commenced about a year ago, now has a circulation of 750 — over 300 of the copies go to residents outside Canada. The Editor reports that adequate manuscript has been coming in, but he would welcome a wider scope of subject material. The Society's annual membership fee is $4.00, which includes subscription to the magazine. Husband and wife membership is $5.00. The Phytopathologists have a special contact with the Microbiologists this year as one of our well-known members is the President-elect, Dr. G. A. Ledingham.

The Society has been approached to act as host for the 8th International Congress for Microbiology. The date for this congress is not settled, but if the International Executive decides on 1960 or 1961, which seems very likely, the Canadian Society will proceed with preliminary plans for a meeting at either Montreal or Toronto.

Another development of interest relates to permanent collections of microorganisms. It is realized that some workers may not have adequate facilities for long term maintenance of organisms which have been studied. An effort has therefore been initiated to have duplicates of all *new* organisms described in the Journal filed in one of the established culture collections.

The Microbiologists annual meeting in 1956 is scheduled for Macdonald College, Quebec, and that for 1957 for the University of Western Ontario, London.

Respectfully submitted,

A. R. Walker.

REPORT OF RESOLUTIONS COMMITTEE

Whereas the Canadian Phytopathological Society has held its 22nd session at Edmonton in conjunction with the Annual Meeting and Convention of the Agricultural Institute of Canada, and whereas the accommodations and facilities placed at the

disposal of the Society have contributed notably to the success of the sessions; be it resolved that we extend our sincere appreciation to:

(1) Our hosts the Edmonton Branch of the Agricultural Institute of Canada.

(2) Dr. G. B. Sanford, Chairman, Program Committee and members of his committee for making arrangements for the regular program for a special social evening and for a symposium on fungicides.

(3) Mr. J. G. McGregor for his address on "The Early History of Alberta".

(4) Drs. J. G. Horsfall and S. Rich, R. A. Ludwig, D. L. McIntosh, and C. D. McKeen for their invitation papers presented at the symposium on "Present Status and Future Trends in Fungicides" under the chairmanship of Dr. H. Martin.

Respectfully submitted,

J. B. Lebeau
F. R. Harper
A. W. Henry (Chairman)

REPORT OF THE TERMINOLOGY COMMITTEE

During the year Dr. D. C. Buckland made additional progress in preparation of the report on the "Terminology of Forest Pathology". Dr. Buckland has obtained the cooperation of Dr. D. R. Redmond and the Canadian Institute of Forestry Sub-Committee on Entomology and Pathology. Dr. Buckland had already circulated two lists of terms compiled by professional groups in other countries. A revised list based on amendments suggested by Canadian workers has now been circulated by Dr. Redmond.

In July, 1954, the Canadian Phytopathological Society's submission on Terminology was presented at a special session of the Phytopathology Section of the VIIIth International Botanical Congress in Paris. About 50 plant pathologists representing eight countries attended the session. It was pointed out that International Botanical Congresses do not provide a frame-work for the establishment of continuing committees. Moreover, most of those present felt that full international agreement on standardization of terms would involve long delays, and might never be attained. The recommendation of the meeting was that whenever a national society had prepared a terminology survey in any of the fields of plant pathology this should be published in a widely-read journal, and would serve as the standard guide for plant pathologists until improved revisions were published.

The survey of "Terminology in Plant Virus Diseases" prepared by the Canadian committee was also presented at this session. The meeting recommended that the C.P.S. prepare this survey for publication. Representatives of nine societies in five other countries indicated that they would appreciate an opportunity to examine the manuscript before publication. A further revision of this survey is being prepared with changes based on suggestions from Canadian and a number of foreign workers.

Respectfully submitted,

D. C. Buckland
W. A. F. Hagborg
B. H. MacNeill
H. M. Good
T. C. Vanterpool
R. S. Willison
R. A. Ludwig
W. E. McKeen
C. D. McKeen
D. J. MacLeod
R. Pomerleau
L. E. Tyner
M. F. Welsh
A. N. Langford
A. W. Henry (Chairman)

ABSTRACTS OF PAPERS PRESENTED AT THE TWENTY-SECOND MEETING OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

OBSERVATIONS ON THE CONTROL OF DWARF BUNT OF WINTER WHEAT

R. J. Baylis, Botany and Plant Pathology Laboratory, Ottawa, Ont.

The presence of dwarf bunt has been established in 22 counties principally in southwestern Ontario.

Preliminary screening trials with fungicides dusted on infested soil in vitro are reported as a promising lead to preventing infection of wheat in the field by light-sensitive dwarf bunt spores which germinate on the soil surface.

By the use of soil plates on which chlamydospores of *T. brevifaciens* G. W. Fischer, had been streaked, a 60 per cent PCNB dust was compared with two dusts containing 40 per cent HCB for their relative effectiveness in preventing the production of sporidia in the soil plates maintained in light at 5°C over a period of eight weeks. The respective dusts were applied at rates equivalent to 5, 10 and 15 lbs. per acre.

At all rates, the PCNB almost completely prevented germination (less than 1 per cent) while the HCB preparations only approached an effective control at the maximum rate of 15 lbs. per acre. Two other experimental fungicides containing equal parts of 40 per cent HCB and 5 per cent organic mercurial, were completely ineffective in preventing sporidial formation at the same rates of application.

Supporting field trials on infested soil were lost as a result of the hurricane in October 1954.

STEM STREAK OF POTATO

L. C. Callbeck and D. B. Robinson, Science Service Laboratory, Charlottetown, P.E.I.

A disease characterized by a brittleness and breaking of stalks and petioles has been observed for many years in potato fields located on light soil areas in Prince Edward Island. Affected plants first show symptoms in mid-summer. Brown streaks appear on stalks and petioles, usually accompanied by a mild chlorosis of the foliage. Investigations have indicated that high soil acidity is an important predisposing factor in this disease, that some control could be achieved by the use of lime, and that varieties appeared to differ in susceptibility.

More intensive work has yielded further knowledge on this disease. Symptoms in the variety Sebago were very slightly decreased by lime applications of 500 pounds per acre, and almost eliminated by applications of 2000 pounds per acre. Twelve potato varieties showed remarkable differences in susceptibility as indicated by the foliage. Green Mountain, Canso, and McIntyre manifested no foliage symptoms; Warba and Pontiac showed trace symptoms; Netted Gem and Katahdin, moderate symptoms; Keswick and Kennebec, severe symptoms; Sebago and Irish Cobbler, very severe symptoms; Cherokee, extremely severe symptoms.

The Cherokee variety was used in another phase of the investigation. Greenhouse studies suggested that the disease is caused by manganese toxicity and further proof was obtained by studies in a "sick" field. Soil applications of Zn, Mg, Mo, Zn + Mo, Mg + Mo, Zn + Mg + Mo were, except the last, ineffective in reducing the foliage symptoms, but Mn ($MnSO_4$. $2H_2O$ at 100 lb. per acre) very markedly increased them. Yields were not influenced by the applications of metallic salts, but they were depressed by almost one third by the manganese salt.

INFECTIVITY OF CEREAL HOSTS BY ERGOT FROM ROADSIDE GRASSES

W. P. Campbell, Plant Pathology Laboratory, Edmonton, Alberta.

Conidial suspensions from 283 isolates of *Claviceps purpurea* (Fr.) Tul. obtained in 1953 from 12 different species of widely distributed common roadside grasses,

and from wheat, barley, rye, oats, wild oats, and *Triticum monococcum* were equally effective in causing ergot in rye, wheat, and barley. There was no evidence from the data obtained that there are any pathogenic races of this fungus in Western Canada. Work with collections made on grasses in 1954 has indicated similar results.

THE EFFECTIVENESS OF FOUR FUNGICIDES AGAINST APPLE SCAB AND THEIR VARIOUS EFFECTS ON THE TREES (RESULTS OF FOUR YEARS' EXPERIMENTS)

L. Cinq-Mars and R. Crête, Science Service Laboratory, St. Jean, Quebec.

From 1950 to 1953 inclusive, experiments were carried on at Rougemont, Quebec, with four different fungicides to test their effectiveness in the control of apple scab and their effects on the growth and yields of the sprayed trees. The fungicides were: Magnetic 70, a paste sulphur; Mulsoid, a wettable powder; Ferbam, a dimethyldithiocarbamate; and Glyodin, an heptadecylglyoxalidine.

Weather conditions favoured the development of the scab disease in the experimental orchard during the years 1950, 1952 and 1953, but were not as critical in 1951. The fungicides were applied as dilute sprays with a conventional high-pressure Bean sprayer. The number of sprays applied of each fungicide were: eleven sprays in 1950, from May 9 to July 19; eight sprays in 1951, from May 4 to July 6; ten sprays in 1952, from May 1 to July 24; and eleven sprays in 1953, from April 24 to July 15.

The results showed that Glyodin was consistently better than the other fungicides as a foliage protectant against scab whereas the sulphurs were the poorest, with Magnetic 70 ahead of Mulsoid. On fruit, Ferbam gave fair results but Mulsoid failed to control fruit scab. There were significant differences between the different treatments. On the other hand, counts of fruit russeting gave erratic results.

As far as yields are concerned, Magnetic 70 gave fewer apples and smaller ones than the other three fungicides but the differences between the various fungicides were not significant. Measurements of the year's growth of shoots and of the diameter of buds on trees sprayed with the different fungicides indicated that Ferbam-sprayed trees had longer shoots and bigger buds, followed in decreasing order by Glyodin, Mulsoid and Magnetic 70, although there was no significant difference between the treatments.

SEED TRANSMISSION OF BACTERIAL WILT OF ALFALFA

M. W. Cormack and J. E. Moffatt, Science Service Laboratory, Lethbridge, Alberta.

Seed obtained by artificial tripping of alfalfa plants severely infected with bacterial wilt, transmitted the disease when it was surface sterilized and used as inoculum for healthy plants in the greenhouse. Shrivelled and discoloured seeds transmitted the disease to a much greater degree than plump sound seeds. In another experiment no infection was produced by cleaned seed collected from 20 moderately infected plants in the field, but the disease was readily transmitted by the pod debris from all of these plants. The bacteria have remained highly viable for over five years in this material when stored dry at room temperature.

In histological studies on infected alfalfa plants, the causal bacteria were observed in sections of seeds stained by a modified Gram technique. The bacteria occurred mainly in the intercellular spaces of parenchymatous tissues of the seed. They were particularly abundant in the vascular tissues of the pedicels and pods. These results indicate that seed from infected alfalfa plants, particularly when poorly cleaned, can be an important factor in the spread of bacterial wilt into new areas.

HEAT TOLERANCE OF HOST AND PARASITE IN FALSE STRIPE OF BARLEY

W. A. F. Hagborg, Plant Pathology Laboratory, Winnipeg, Man.

The thermal inactivation temperature of the stripe mosaic (false stripe) virus in infective juices (64.1° C.) was found to be higher than the thermal death point

of the barley seed in water (60° C.). Barley seed heated in carbon tetrachloride retained more than 50 per cent of its germinability after treatment at 76.8° C. for two hours, but the treatment failed to inactivate the false stripe virus.

ON THE USE OF SEED INFESTED WITH THE ERGOT FUNGUS

A. W. Henry, J. D. Gilpatrick, and E. A. Peterson, University of Alberta, Edmonton, Alberta.

Cereal grains infested with sclerotia of the ergot fungus are not necessarily unsuitable for seed. Sclerotia mixed with them and held under average granary conditions in western Canada may remain viable for more than one and probably for several years, so holding infested seed under such conditions has limited value for the control of the ergot disease but even so infested grain can be safely used for seed.

If sclerotia are sown with the seed they are likely to germinate in the soil but they are unlikely to function in the production of effective inoculum for the initiation of the ergot disease if deposited in the soil at usual seeding depths for cereals. In a replicated field test at Edmonton which included seedings at depths ranging from 0 to 3 inches and at one-half inch intervals no stromatic heads were found to reach the soil surface where inoculum could be released, from any sclerotia sown more than one inch deep. Those sown at a depth of one-half inch produced the largest number of emerged stromatic heads. This is noteworthy in relation to the use of infested seed of perennial grasses as well as that of cereals.

Soil temperature and moisture following seeding greatly influence the germination of sclerotia sown with the seed. No germination may occur if extremes of soil temperature and/or soil moisture prevail. On the other hand good germination may be expected in fairly cool, moderately moist soil. In general, sclerotia sown in the fall under Alberta field conditions, appear more likely to germinate and to function in the production of effective inoculum the following season, than those sown in the spring.

TIMING OF ORGANIC MERCURY FUNGICIDE APPLICATIONS ON APPLES

J. F. Hockey and R. G. Ross, Plant Pathology Laboratory, Kentville, Nova Scotia.

Control of apple scab has been obtained in Nova Scotia by the use of organic mercury fungicides applied on a post infection period schedule. Three or four applications of the materials up to and including the calyx spray followed by two or one applications of a protectant have given excellent commercial results. Comparable plots sprayed with protectants only have received from 6 to 9 applications at 7 to 14 day intervals during the same season. The method of timing applications of eradicants has been to spray after the first infection period in the spring which has been found to provide protection for seven days. The next application was applied following an infection period after the seven day interval. Intervals between applications have varied from 10 to 21 days. Rainfall between applications of eradicants has varied from 0.21 inches to a maximum of 2.13 inches.

A *DIAPORTHE* CANKER OF *BETULA LUTEA*

Ruth M. Horner, Botany and Plant Pathology Laboratory, Ottawa, Ont.

In the course of a survey of the mycological flora of the dying tops of yellow birch trees made during 1949 and 1950 in connection with studies of deterioration of birch in Ontario, an interesting canker and foliage disease of *Betula lutea* was observed. Isolations made from the cankers and diseased foliage consistently yielded a fungus identified as *Phomopsis* sp. The perfect state of this *Phomopsis* was found to be a *Diaporthe* sp. which is similar morphologically to *Diaporthe eres* Nits. It is designated as *Diaporthe eres* f. sp. *betulae* because of its pathogenic significance on *Betula lutea.*

The types of disease lesions from which the fungus was isolated consistently have been reproduced by artificial inoculation on one-to three-year-old seedlings kept under favourable growing conditions in the greenhouse and on four-to six-year-old saplings in nurseries at the Central Experimental Farm, Ottawa. The results of these experiments and field observations show that *Diaporthe eres* f. sp. *betulae* is a facultative parasite which may kill foliage and new shoots and cause superficial bark cankers on young branches.

The cankers girdled only a small percentage of the branches infected, either when infection was induced artificially on seedlings and saplings growing under favourable conditions or when it occurred naturally on mature trees in the field. Experiments in greenhouse and nursery have shown that seedlings and saplings, under conditions favourable to growth, will recover from invasion by this fungus if no secondary factors intervene, although a two to three-year period is required for cankers to be healed over completely. However, when inoculated seedlings were kept in light of low intensity in the greenhouse, a greater percentage of main stems were girdled by cankers and those with cankers of lesser extent healed more slowly. On suppressed saplings in the nursery, cankers were more extensive and were healed over more slowly than those on healthy trees.

Field observations and the results of artificial inoculations indicate that *Diaporthe eres* f. sp. *betulae* may be significant in the field from two aspects. On mature trees, stubs of dead shoots and cankers caused by this fungus may form an infection court for secondary invasion by other fungi. Wood rotting basidiomycetes have been isolated from old cankers and from dead branches beyond cankers and one of these, *Fomes fomentarius* has been reported as one of the fungi isolated from rotting tops of standing *Betula lutea* in Ontario and in the Maritimes. On young seedlings, it may be a serious pathogen since the natural environment of *B. lutea* seedlings, particularly light of low intensity and high humidity, favours infection by this fungus.

CYTOLOGICAL STUDIES OF *HELMINTHOSPORIUM SATIVUM* AND ITS PERFECT STAGE *COCHLIOBOLUS SATIVUS*

S. B. Hrushovetz, Plant Pathology Laboratory, Edmonton, Alberta.

In a study of conidial production of *Helminthosporium sativum* several lines of evidence suggest the existence of a cytological mechanism for the perpetuation of heterokaryons. Two or more nuclei from the multinucleate mycelial cells enter the young conidiophores and several nuclei invariably enter the young conidium before the latter is cut off from the conidiophore. Delayed septation of advancing hyphal tips may cause the presence of diverse kinds of nuclei in the multinucleate mycelial cells.

Chromosome pairing in the definitive ascus occurs between highly contracted chromosomes. Apparently the haploid chromosome complement is eight. Ascospore inception occurs at the 'eight' nucleate stage and each spore is provided with one nucleus. There are evidently structural differences in the chromosome complement of the mating pair used. This is indicated by the occurrence of abnormal divisional figures, asci with fewer than eight ascospores, and degenerating ascospores.

THE INJURIOUS EFFECT OF TIMOTHY AND RYE INFUSIONS ON TOBACCO SEEDLINGS

L. W. Koch and Z. A. Patrick, Science Service Laboratory, Harrow, Ontario.

In studying the relation of preceding crops to tobacco, experiments were conducted to determine the morphological and physiological changes produced by soil-water infusions of timothy and rye on tobacco seedlings. The toxicity of timothy infusions to tobacco seedlings increased with aging up to 21 days when an average of 71 per cent inhibition of respiration was obtained. Similar studies using rye showed highest levels of toxicity when rye infusions were approximately 10 days old. These infusions inhibited the respiration of tobacco seedlings by an average of 40 per cent, declining thereafter. Timothy or rye infusions which had been autoclaved

before incubating had little or no effect on the respiration of tobacco seedlings. It is concluded that certain toxic substances are produced during the microbial degradation of both timothy and rye residues. Toxic factors from rye were produced sooner, were less potent and were deactivated earlier than in the case of timothy. Further studies showed that a 19-hr. pre-exposure period to timothy infusions resulted in almost total inhibition of respiration. Tobacco seedlings placed in toxic infusions manifested wilting and a brownish discoloration of root tissues usually in less than 24 hours.

STUDIES ON THE EFFECT OF PEPPER EXTRACT ON LOCAL LESION PRODUCTION IN COWPEA AND A FEW OTHER INDICATOR HOSTS

C. D. McKeen, Science Service Laboratory, Harrow, Ont.

Previously reported studies have shown that juice expressed from *Capsicum frutescens* L. plants contains a substance which when added to virus inoculum either inhibits or greatly reduces local lesion production on certain hosts. More recent tests have shown that the inhibitive response is obtained when a dilute pepper extract solution is applied to the lower surfaces, as well as to the upper surfaces, of the inoculated leaves. Pre-inoculation treatment induces much greater inhibition than post-inoculation treatment. Application of the inhibitor to one half of the lower leaf surface inhibits lesion formation uniformly over the entire inoculated upper surface. Moreover, a less pronounced, though readily demonstrable, inhibitive effect is produced in cowpea when the opposite primary leaf is treated. Respiration studies do not indicate that the increased respiration rate of leaves exposed to the pepper juice will explain the inhibition produced on some hosts and not on others.

PRODUCTION OF A SUBSTANCE WHICH INHIBITS THE GROWTH OF *PHYTOPHTHORA FRAGARIAE* WHEN REDUCING CARBOHYDRATES ARE HEATED IN SOME CULTURE MEDIA

W. E. McKeen, Plant Pathology Laboratory, Saanichton, B.C.

Reducing carbohydrates in culture media, sterilized by autoclaving, inhibit the growth of *P. fragariae*. Three possibilities of the cause of the inhibitory action when reducing carbohydrates were heated in the media were: (A) production of a toxic or fungistatic compound from the reducing carbohydrate, (B) removal of an essential substance, (C) production of a toxic or fungistatic compound as a result of a reaction between the reducing carbohydrate and some constituent(s) of the media. The product(s) of interaction between reducing carbohydrates and amino acids could be the toxic or fungistatic substance produced in culture media.

RED STAIN IN LODGEPOLE PINE

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Forest pathological investigations of 133 living trees of even-aged (85 years) lodgepole pine in Alberta have shown that 90% of all infections encountered were firm red stain. Of the 150 infections of red stain identified with four principal fungi, *Stereum pini* was associated with 86% of these infections, *Fomes pini* with 7%, *Polyporus anceps* with 4%, and *Stereum sanguinolentum* with 3%. The two most important fungi associated with red stain, *Stereum pini* and *Fomes pini*, enter the host predominantly through branch stubs. Other infection courts may be fire scars, falling tree scars, and roots. *Stereum pini*, previously considered unimportant in lodgepole pine, is described as to habit and development in living trees.

THE OCCURRENCE OF *CURVULARIA* ON GLADIOLUS IN CANADA

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Curvularia was first described as a parasite of gladiolus in 1948 by Dr. R. O. Magie. He reported it from Florida and Alabama noting that the first serious incidence occurred in 1947. In Canada, 1953, *Curvularia* was first isolated from corms grown in the Montreal area in 1952.

The fungus attacks all parts of the plant; corms, stems, leaves and flowers. Corm lesions are light to dark brown, slightly sunken, irregularly circular and occur on the corm cheek. Spots that appear on the top growth are oval or somewhat elongated, tan to dark brown in colour and range in size up to an inch in diameter. By coalescence they may extend to include a large portion of the leaf. Blossom spotting has not been seen on Canadian produced flowers.

Although the fungus grows over a wide temperature range (50-90°F.) optimum temperature has been found to be 75-85°F. This is also the optimum for infection as determined by McClellan and Marshall (1950).

The fungus grows luxuriously on P.D.A. and various gladiolus agar concoctions sporulating within 4-6 days. The four celled spores, produced sympodially, are light brown. The third cell from the base is darker in colour and noticeably swollen. A perfect stage has never been described for *Curvularia.* In culture various investigators have seen elongated black structures which have been referred to as "Pillars". Also, on the dried corm scales and embedded in culture media globular masses of undifferentiated fungus mycelium have been seen. These, when plated, produced conidiophores and conidia. Their function apparently is to ensure the survival of the fungus.

The binomial currently in use for the *Curvularia* on gladiolus is *C. lunata* (Wakker) Boedijn. However, recent morphological studies indicate that the fungus compares more closely to the type of *Curvularia trifolii* (Kauff.) Boedijn.

A NEW NEEDLE BLIGHT OF DOUGLAS FIR SEEDLINGS CAUSED BY *ROSELLINIA HERPOTRICHIOIDES* HEPTING AND DAVIDSON

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J. R. Long, British Columbia Forest Service Nursery, Duncan, B.C.

During fall and winter, 1954 to 1955, *Rosellinia herpotrichioides* Hepting and Davidson damaged 2-0 Douglas fir at the Duncan nursery, killing all needles within a stratum of continuing high humidity. The boundary of the stratum started at ground line inside seedbed borders and became higher toward the centres where, on many otherwise suitable seedlings, needles still alive formed much-shortened crowns; and so the seedlings were culled.

The disease was noticed in fall, 1954. Winter damage, 1953 to 1954, had resulted in dead needles, a possible substrate for increase of *Rosellinia.* Beds most damaged by needle blight had high water tables. Increased germination there resulted in more seedlings which grew taller in the moister soil. Dense stands and high water table would help maintain a humidity favouring aerial growth of mycelium over needles.

The disease appeared to have intensified by early 1955. The junior author estimated that in 30 beds almost three-tenths of the seedlings were culled because of needle blight. In 270 beds, culling because of this disease was occasional. For all beds, cull averaged 3 per cent from needle blight and less than 10 per cent from other defects.

In vitro, optimum temperatures for radial growth of *Rosellinia* were between 20 and 25 degrees C. At 3 to 4 degrees growth was slight. At zero, growth was nil. Winter low temperatures would slow fungus growth; heavy precipitation, normal to the Duncan nursery in winter, would favour aerial fungus growth over the seedlings.

This is a first report of the fungus: on Douglas fir, in a nursery, and in British Columbia. It was previously described by Hepting and Davidson, and first noted by Graves, on Eastern hemlock in North Carolina.

FORMATION OF SCLEROTIA BY *RHIZOCTONIA SOLANI*

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In nature, sclerotia of *Rhizoctonia solani* are initiated on new hyphal growth. The presence of condensed water vapor appears to be an essential factor. In the

soil, extra nitrates, phosphates, potash, and other mineral or carbohydrate nutrients as such are relatively unimportant to their incidence. Sclerotia form freely on glass, potato tubers, stone, straw, wood, and in the soil, and more readily at a temperature of 61° than at 75°C. Sclerotia may be prevented or depressed in soil by vigorous growth of the antibiotic fungus *Trichoderma lignorum.*

HISTOLOGICAL EXPRESSION OF RESISTANCE AND SUSCEPTIBILITY IN BARLEY VARIETIES TO TWO STRAINS OF *HELMINTHOSPORIUM GRAMINEUM* RABH.

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Helminthosporium gramineum incites the stripe disease of barley. The usual symptoms are the formation of yellow streaks in the leaf blades and sheaths followed by necrosis and shredding of leaf tissue, dwarfing of the entire plant, and aborting of the heads. In the susceptible combinations, the fungus enters through the coleorhiza and rapidly moves into the scutellar node and first internode. Successive internodes and leaves are invaded only after they have reached a certain degree of physiological maturity. In the young leaves and culm the unbranched mycelial strands grow intra- and inter-cellularly through the parenchymatous cells as well as inside the lumen of the xylem vessels. The chloroplasts of the spongy mesophyll cells deteriorate. In mature leaves the fungus ramifies in the mesophyll tissue. Eventually thick conidiophores emerge through the ruptured epidermis. The weakening of the last internode and the drying up of the auricle of the last leaf result in imperfect emergence of the head.

In resistant combinations only the outer two or three cell layers of the coleorhiza are penetrated. The cells in this area react noticeably, taking up stain heavily, and gradually breaking down.

The seminal roots of resistant as well as susceptible varieties are invaded. However, systemic infection does not result usually from this source even in susceptible varieties.

CAUSALITY OF MORPHOGENESIS OF MYCORRHIZAL PINE ROOTS

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The remarkable differences in the morphology of mycorrhizal and non-mycorrhizal roots of pine is a well-known phenomenon. One of the main characteristics of mycorrhizal roots is their dichotomous branching. Experimental evidence has been obtained that this dichotomy is induced by substances exuded by the lower symbiont. The conclusion that these substances are related to auxins is based upon the fact that it is possible to induce dichotomous branching of pine roots, experimentally, by applying synthetic auxins such as Indole-3-acetic acid, Naphthalene-1-acetic acid and others. Furthermore, depending upon the concentration of auxin used, it is possible to reproduce not only the dichotomously branched short roots, which morphologically resemble the coralloid mycorrhiza, but also formations that resemble single and tubercle mycorrhiza as well as the intermediate forms and variations of mycorrhizal roots. As is the case in mycorrhiza, the reproduced structures display an hypertrophy of the cortex cells and an absence of root hairs.

Experimental evidence obtained in the laboratory and the morphological studies of mycorrhizal roots in the field, has led to the conclusion that when the auxin exuded by mycorrhizal fungi in roots reaches a certain concentration, it inhibits the elongation of the invaded roots. The ensuing hypertrophy of the cortex cells results in root swellings. Furthermore, the formation of root hairs is prevented.

The degree to which the morphological changes in roots takes place is directly proportional to the concentration of auxin exuded by the fungal associate. When the auxin concentration is relatively low the mycorrhizal roots are long and only slightly swollen. With an increase in the concentration, the roots are shorter, increasingly swollen and often displaying dichotomy. In a high concentration the

increasing hypertrophy results in the formation of mycorrhizal roots which resemble nodule-like bodies, known as tubercle mycorrhiza.

When for some reason the concentration of auxin in the exudate of the fungal symbiont decreases, then the restrictive effect upon the growth of mycorrhizal short roots is released and the root tips renew their growth longitudinally and break through the hyphal sheath. A new increase of auxin concentration can repeat the inhibition of the renewed growth. Each release of growth is marked by a constriction.

Spontaneous development of numerous new short roots among the old ones is another characteristic often observed. Laboratory experiments indicate that the growth of long roots also can be influenced by the auxin which the fungal associate exudes in mycorrhizal short roots. This influence manifests itself in the following way: longitudinal growth of the long root becomes more or less inhibited and the distal part of the root becomes swollen. This appearance then is often accompanied by the emergence of new short roots arising most commonly in the axils of the old ones.

Field observations indicate that the morphological changes in mycorrhizal roots of other tree species may also be explained by the excesses of auxins exuded by mycorrhizal fungi.

Since the favourable effect of mycorrhiza on the growth of forest trees is undeniable, experiments have been undertaken in nurseries to obtain vigorously growing seedlings through the establishment of well developed mycorrhiza. Some of the results already obtained are discussed.

SOURCES OF INHIBITORS OF BARLEY FALSE STRIPE VIRUS INFECTION

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Inhibitors of barley false stripe virus were sought in the expressed juice from leaves of 36 species of herbaceous plants, skim milk, and filtrates from potato dextrose infusion cultures of 43 soil-borne fungi. The preparations to be tested were added to an equal volume of a 1:10 dilution of juice from false stripe-diseased barley leaves. Barley was then inoculated with these mixtures by the carborundum rub method. Inhibition was indicated when fewer plants developed false stripe symptoms from inoculum diluted with certain preparations than from inoculum similarly diluted with water.

A 1:20 dilution of juice from leaves of *Capsicum frutescens, Chenopodium album,* and *Monolepis nuttalliana* caused complete inhibition of false stripe symptoms on barley. Juice from *Salsola pestifer, Solanum tuberosum,* and *Fragaria* sp. sometimes caused complete. but usually only partial, inhibition of false stripe symptoms. Skim milk and juice from *Capsicum frutescens* and *Fragaria* sp. caused inhibition of barley false stripe and wheat streak mosaic on both wheat and barley. *C. frutescens* caused a high degree of inhibition of barley false stripe even when a dilution of 1:200 was mixed with an equal volume of virus inoculum. Milk showed a marked decline in its inhibitory effect when diluted at 1:40 or higher. The filtrates from more than 25 per cent of the cultures of fungi tested caused strong inhibition of the development of false stripe on barley.

INDUCED MUTATION IN *HELMINTHOSPORIUM SATIVUM*

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Conidia of the common rootrot fungus *Helminthosporium sativum* suspended in water were treated with various mutagenic agents. The procedure followed when ultra-violet light was used is described in detail. Ultra-violet radiation exerted a considerable lethal effect on the spores that increased with the time of treatment. The olivaceous spores of a wild type isolate were much more resistant than the spores of an albino isolate to equal doses of radiation. Ultra-violet light greatly increased the frequency with which mutations appeared in cultures of both the

wild type and the albino spored line. Mutants were obtained that differed from their parents and each other in such characters as morphology, degree of sporulation, rate of growth, nutrient requirements, and pathogenicity. Some of the mutants may be useful in investigations of heterocaryosis and genetics in *H. sativum*.

DAMPING-OFF PATHOGENS ON FOREST TREES

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Many organisms were isolated from young diseased tree seedlings at Saskatchewan forest nurseries. The most numerous isolates were species of *Fusarium, Pythium, Rhizoctonia, Alternaria, Phoma* and *Cylindrocarpon*. Jack pine and *Caragana* seedlings growing in sterile test tubes were inoculated with the isolates. In the tubes *Rhizoctonia* and *Pythium* isolates killed all seedlings in a few days. Isolates of *Fusarium* (8 species), *Alternaria, Phoma, Cylindrocarpon* and many other fungal genera were less pathogenic. Under conditions favouring pathogenicity various degrees of pathogenic potentials were represented by the fungal isolates.

Five isolates of different fungal genera and a nematode were used in inocula in greenhouse tests with unsterilized nursery soil. *R. solani* reduced the emergence of *Caragana* from 95 to 50% and that of Scots pine from 99 to 73%; postemergent losses were 68 and 64% respectively. *R. solani* did not reduce emergence of spruces but caused significant postemergent losses in one of the two progenies of each of Colorado spruce and white spruce. *Pythium (? debaryanum)* was slightly pathogenic to seedlings of all trees and significantly so to those of one white spruce. *Fusarium oxysporum* var. *redolens* seemed to be mildly pathogenic to seedlings of one Colorado spruce. *Alternaria tenuis* and nematode *(Panagrolaimus* sp.) inocula were not pathogenic in this test.

Fusarium spp. were commonly isolated from roots of the surviving apparently healthy seedlings. Possibly these fungi were parasitic but only weakly pathogenic. A "mixed" inoculum caused less mortality than did *Rhizoctonia* alone. This suggests useful antagonism between some constituents of the inoculum. *Microbiological* antagonism was also considered to have influenced the decreased virulence of the inoculum fungi in soil as compared to their virulence in sterile test tubes. The tree species and also progenies of seed trees within some species responded somewhat differently to various inocula. The germination of a spruce progeny was increased by *Rhizoctonia*.

SOME EFFECTS OF ANTIBIOTICS ON *HELMINTHOSPORIUM SATIVUM* P.K. & B.

E. W. B. Ward and A. W. Henry, University of Alberta, Edmonton, Alta.

The growth and sporulation of *Helminthosporium sativum* in these studies was influenced both favourably and adversely by antibiotic substances (actidione, griseofulvin and polymyxin B) and certain bacterial isolates (chiefly *Bacillus polymyxa* and strains of *Bacillus subtilis)*.

In the case of actidione the concentration at which it became inhibitive varied with the duration of the experiment. Generally low concentrations (0.1-1.0 p.p.m.) of the antibiotics caused increases in sporulation and spore lengths. The presence of *B. polymyxa* had a similar effect under some conditions, while *B. subtilis* regularly reduced sporulation and caused hyphal distortion with frequent development of spherical bodies laterally on the hyphae, sometimes in chains.

In cases where spore length was stimulated by antibiotics the spores resembled closely those typical of field collections, and it is possible that "normal" spore production in nature may depend to some extent on antibiotic influences.

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